Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Profound Racial Disparities in COVID-19 Associated Hospitalizations in Rural Southwest Georgia

Rilee Racine MD candidate , Priyank Shah MD, MPH, FACC , Justin Xavier Moore PhD, MPH , Jameson Kenerly MD candidate , Jack Owens MD, MPH , David C. Hess MD

PII: S0002-9629(21)00404-3
DOI: https://doi.org/10.1016/j.amjms.2021.10.013
Reference: AMJMS 1507

To appear in: *The American Journal of the Medical Sciences*

Received date: 2 April 2021
Accepted date: 21 October 2021

Please cite this article as: Rilee Racine MD candidate , Priyank Shah MD, MPH, FACC , Justin Xavier Moore PhD, MPH , Jameson Kenerly MD candidate , Jack Owens MD, MPH , David C. Hess MD , Profound Racial Disparities in COVID-19 Associated Hospitalizations in Rural Southwest Georgia, *The American Journal of the Medical Sciences* (2021), doi: https://doi.org/10.1016/j.amjms.2021.10.013

Profound Racial Disparities in COVID-19 Associated Hospitalizations in Rural Southwest Georgia

Rilee Racine, MD candidate[1], Priyank Shah, MD, MPH, FACC[2] ; Justin Xavier Moore, PhD, MPH[3]; Jameson Kenerly, MD candidate1; Jack Owens, MD, MPH[4]; David C. Hess, MD[5]

(1) Medical College of Georgia, Southwest Clinical Campus, Albany, GA

(2) Department of Cardiology, Phoebe Putney Memorial Hospital, Albany, GA, USA

(3) Division of Epidemiology, Department of Population Health Sciences, Augusta University, Augusta, Georgia, USA

(4) Department of Neonatology, Phoebe Putney Memorial Hospital, Albany, Georgia, USA

(5) Department of Neurology, Medical College of Georgia, Augusta University, Augusta, Georgia, USA

Corresponding Author at : Rilee Racine, 225 West 4th Ave. Apt. 202B Albany, GA 31701 (E-mail: rracine@augusta.edu).

Key words: COVID-19, African American, morbidity, mortality

Abstract

Background: The coronavirus disease 2019 (COVID-19) is responsible for one of the largest public health crises the United States has seen to date. This study explores the outcomes of African American and non-African American COVID-19-positive patients hospitalized in rural Southwest Georgia to identify differences in morbidity and mortality between the groups.

Methods: We performed a retrospective cohort analysis among adults aged ≥18 years admitted with COVID-19 between March 2, 2020 and June 17, 2020 at Phoebe Putney Health System. Data on demographics, comorbidities, presenting symptoms, and hospital course were obtained. Patients were divided into two groups: African Americans and non-African Americans. We examined differences in patient characteristics between groups using chi-square tests for categorical variables, t-test for parametric continuous variables, and Wilcoxon rank-sum tests for non-parametric continuous variables. Statistical Analysis Software (SAS) version 9.4 was used for statistical analysis.

Results: Among 710 patients, median age was 63 years, 43.8% were males, and 83.3% were African Americans. African Americans had higher prevalence of obesity and hypertension, were more likely to present with fever, and present with longer duration of symptoms prior to presentation. In-hospital mortality was similar between the groups, as was need for mechanical ventilation, ICU care, and new dialysis. African Americans were more likely to be discharged home compared to non-African Americans.

Conclusions: There was no difference in in-hospital mortality; however, African Americans had disproportionately higher hospitalizations, likely to significantly increase the morbidity burden in this population. Urgent measures are needed to address this profound racial disparity.

Introduction

The coronavirus disease 2019 (COVID-19) is responsible for one of the largest public health crises the United States (U.S.) has seen to date. The U.S. alone is responsible for roughly one-fourth of the overall cases reported globally.[1] The causative agent, SARS-CoV-2, colonizes the oropharynx, causing an infectious acute respiratory syndrome and leading to a myriad of symptoms affecting various organ systems.

Populations at greatest risk of experiencing serious illness include low socioeconomic communities and communities of color.[2] In July, roughly six months after the first reported case of COVID-19 in the US, African Americans (AA) alone represented less than 13.4% of the population but more than one-third of confirmed COVID-19 positive patients.[3] In February 2021, AA represent 12.9% of documented cases and 17% of deaths due to COVID-19 nationally.[4] In Georgia alone, AA comprise roughly 32.6% of the population and 26.8% of confirmed COVID-19 cases.[5] However, this racial group represents 40.5% of COVID-19-related hospitalizations and 37.8% of deaths in the state.[5] In a correlational analysis of 2886 counties across the US, researchers found a positive correlation between the number of African American patients who live in a county, were COVID-19 positive, and died from COVID-19.[6] Counties reporting higher numbers of African Americans were suggested to have increased risk of COVID-19-related deaths. These communities were found to have higher numbers of previous underlying health conditions, such as lung and heart disease, possibly contributing to the increased risk of mortality.[6] There are further suggestions that these disparities are not isolated to the novel coronavirus but transcend structural inequalities previously in existence.[7] Regardless, evidence exists to support African Americans are disproportionately impacted by COVID-19.

This study explores the outcomes of AA and non-AA COVID-19-positive patients hospitalized in rural Southwest Georgia. Analysis of these two groups aims to identify differences in morbidity and mortality in a unique patient population of which African Americans represent more than 80% of all COVID-19-related hospitalizations.

Methods

Analysis of this data received Institutional Review Board approval. Patient consent was not required based on the nature of our study. We performed a retrospective cohort analysis among adults aged 18 years and older admitted with COVID-19 between March 2, 2020 and June 17, 2020 at Phoebe Putney Health System (PPHS). The PPHS has a total of 792 beds and serves 42 counties in southwest Georgia, with a total population of approximately 815,000. Phoebe Putney Health System (PPHS) is the only trio of inpatient centers covering a 40-mile radius. The closest hospital is Crisp County Regional in Cordele, GA which is 40 miles from the PPHS. The Phoebe Putney Health System is comprised of three health centers within Albany, GA: Phoebe Putney Memorial Hospital Main Campus, Phoebe Putney Memorial Hospital North Campus, and Phoebe Worth Medical Centers. In efforts to best contain COVID-19, all COVID-positive who presented to any of these centers were admitted or transferred to Phoebe North, one of these three institutions. Therefore, Phoebe Putney Memorial Hospital North Campus was the single center who cared for COVID-19 positive patients within a 40-mile radius. Cases were confirmed by reverse transcriptase polymerase chain reaction. Positive cases include those with an initial positive result and positive re-tests of those who had initial negative results with repeat testing. Only patients with an outcome (discharged alive or expired) by June 17, 2020 were included for analysis. Transferred patients who required medical treatment unavailable at our hospital or exceeded our hospital's maximum capacity were excluded. Patients transferred to Phoebe Putney Memorial Hospital North Campus from one of the other two facilities within this hospital system were included as a single case. Two independent abstractors reviewed the charts and obtained the data. The data was collected from two different electronic medical records, Meditech and Athena.

Patient characteristics included age, BMI, sex, obesity status, hypertension, coronary artery disease (CAD), congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), asthma,

chronic kidney disease (CKD), end-stage renal disease (ESRD) requiring dialysis, diabetes mellitus, cancer, immunosuppression, chronic liver disease, and smoking status prior to the onset of COVID-19. Presenting symptoms included shortness of breath, cough, fever, nausea, vomiting, diarrhea, abdominal pain, duration of symptoms, altered mental status (AMS), and severe COVID disease [severe pneumonia, septic shock, or acute respiratory distress syndrome (ARDS) on presentation]. Lab values included D-dimer, lactate dehydrogenase (LDH), procalcitonin, ferritin, and C-reactive protein (CRP). In-hospital outcomes included in-hospital mortality, need for new dialysis, need for mechanical ventilation, and ICU transfer. Patients were divided into 2 racial categories: African Americans, and non-African Americans. Our non-African American group could be further broken down into Caucasian, Asian, and other race. Data on demographics, comorbidities, presenting symptoms, and hospital course were obtained.

We examined differences in patient characteristics between non-African American and African American patients using chi-square tests for categorical variables, t-test for parametric continuous variables, and Wilcoxon rank-sum tests for nonparametric continuous variables. We performed a series of generalized linear models with a log-binomial distribution to determine the association of race with 1) in-hospital mortality, 2) mechanical ventilation, 3) intensive care unit (ICU) admission, 4) new dialysis, and 5) discharge to home. We sequentially adjusted our models for 1) BMI, hypertension, coronary artery disease, chronic obstructive pulmonary disease, chronic liver disease, 2) alcohol use, and 3) fever, cough, and duration of symptoms, and 4) biomarkers. We performed an additionally fully adjusted model controlling for age, BMI, sex, hypertension, diabetes, CAD, CHF, COPD, CKD, immunosuppression, duration of symptoms, and severe illness at presentation. We considered p-values ≤ 0.05 statistically significant. We presented the estimates from our log-binomial models as Relatives Risks (RRs) and associated 95% Confidence Intervals (CIs). Statistical Analysis Software (SAS) version 9.4 was used for statistical analysis.

Results

Among the first 710 patients, the median age was 63.0 years, 43.8% were male, and 60.1% had obesity (Table 1). African Americans accounted for the vast majority of inpatients, 83.3% (n = 592/710). African Americans were more likely to be obese (63.5% vs. 42.4%; p < .01) when compared to non-African Americans. Of the 16.7% of non-African Americans, 85.0% were Caucasian, 1.9% were Asian, and 13.1% were "other race". African Americans were more likely to have hypertension as a baseline comorbidity when compared with non-African Americans while non-African Americans were more likely to have coronary artery disease (CAD), chronic obstructive pulmonary disease (COPD), and chronic liver disease. There was no difference in total baseline comorbidities by race. African Americans were more likely to have a history of alcohol use (10.1% vs. 2.5%; p < .01) when compared non-African Americans.

The most common presenting symptoms were shortness of breath (54.9%), fever (43.5%), and cough (40.3%) (Table 2). African Americans were more likely to present with fever (46.1% vs. 30.5%; p < .01), and cough (43.4% vs. 24.6%; p < .01) when compared to non-African Americans. African Americans were more likely to have a longer duration of symptoms on arrival to the emergency department (ED) (10.0 vs. 6.7, median; p = 0.01). Proportion of patients presenting with severe illness was similar in both groups (50.3% vs 48.3%, p = 0.7). A higher proportion of African American patients developed ARDS (21.1% vs 14.4%, p = .1) and septic shock (10.0% vs 8.5%, p = .6) during hospitalization, although differences were not statistically significant. African Americans had higher levels of ferritin (1021 ng/mL vs. 620 ng/mL, p < .01) and lactate dehydrogenase (364 U/L vs. 285 U/L, p < .01) when compared to non-African American patients.

We provide the associations between race and outcomes in Table 3. The overall mortality was 16.3%. Risk of in-hospital mortality was lower in African Americans compared to non-African Americans

(16.1% vs 17.8%, p = .9) as was ICU admission (25.8% vs 30.5%, p = .71), but differences were not statistically significant. Mechanical ventilation risk was numerically higher in African Americans compared to non-African Americans (19.9% vs 17.0%, p = .97), but this difference was not statistically significant either. Risk of new dialysis was equal in both groups (9.6%, p = 1.21). There was no significant difference in these four outcomes after adjustment of confounding variables. Due to instability of the models, additional adjustment for biomarkers and model 5 was not possible for these four outcomes. The occurrences of events were low and complicated by too many confounding variables. In unadjusted analysis, African Americans were 35% more likely to be discharged to home (relative risk (RR): 1.35; 95% confidence interval (CI): 1.12 – 1.64) when compared with non-African Americans. After adjustments for potential confounders, African Americans were still 12% more likely to be discharged home (in opposition to rehabilitation facilities) compared to non-African Americans (Table 4).

Discussion

Our study examined the racial differences in the characteristics and outcomes of hospitalized COVID-19 patients in Southwest Georgia. African Americans had higher prevalence of obesity, HTN, CHF, and diabetes. Although African Americans comprise 13.4% of the US population, and 46% of the overall population in Southwest Georgia, this group represented 83% of the 710 inpatients at PPHS.[3,4] African Americans do not demonstrate an increase in mortality or other outcomes such as need for mechanical ventilation, ICU care, and new dialysis; however, they show an increased risk in COVID related hospitalizations. Although severe illness on presentation was similar between the two groups, for the remaining patients who had tested positive as outpatients and were subsequently admitted, the type and frequency of interim care received in the ambulatory setting and whether there were racial differences in the receipt of care remain unclear. Regardless of these factors, due to the sheer fact that African Americans have disproportionately higher hospitalizations, their overall mortality will be higher compared to non-African Americans. African American patients had higher inflammatory markers like ferritin, LDH, and CRP. These findings may suggest a different immune response to COVID-19 according to race. African ancestry was associated with a stronger inflammatory response to pathogens than European ancestry in a study examining population differences in the immune response to pathogens.[8]

A significant proportion of patients will require rehabilitation after COVID-19 infection, especially those who had severe COVID-19, required mechanical ventilation, and ICU care.[9] In our study, African Americans were more likely to be discharged home. The reason for this is unclear. It is possible that there may be personal preference for African Americans to go home as family visitation at rehabilitation facilities was limited during those times. Lack of access to rehabilitation facilities due to lack of insurance/not covered by insurance could be another explanation. For whatever reason, if indeed, African Americans who needed rehabilitation but were discharged home could delay their

recovery, may increase their risk of rehospitalization, and ultimately add to long-term morbidity. Our findings suggest that more studies are required to better understand the reasons for this disparity and its long-term implications.

Our findings are similar to prior studies. Black race has previously been associated with increased hospitalization among COVID-19 patients; however, race has not been associated with mortality among patients who were hospitalized.[10,11] In one study, 70.6% of deaths were African American in a population of which black race comprised 70.4% of COVID-positive patients.[11] While diabetes, hypertension, CKD, and obesity were more prevalent in African Americans, black race was not found to be an independent risk factor of mortality.[11] Similarly, our data shows higher prevalence of obesity and hypertension in African Americans without increased mortality. Additionally, higher than expected hospitalization rates have been seen in African Americans compared to non-African Americans in previous studies as well as ours.[10] This disproportionately higher hospitalization rate is likely to increase morbidity burden in this population as we learn more about the long-term effects of COVID-19. A majority of studies highlight the mortality rates associated with Sars-CoV2; but we have yet to understand the extent of the associated morbidity and how higher risk groups such as African Americans may be affected.

Racial differences in COVID-19-related hospitalizations in African American patients are likely multifactorial. The living conditions of this ethnic group could play a role in the disproportionality. African Americans are more likely to live in densely populated areas, farther from grocery stores and medical facilities, and(or) in multigenerational households.[5] As a result, these factors make it more difficult to practice social distancing, take precautions to protect older family members, isolate the sick, and increase the general likelihood of severe illness requiring hospitalization. Increased hospitalization

in African Americans may be partly attributed to decreased access to healthcare as well.[12] Previous studies suggest African Americans are more likely to have limited access to outpatient services and less likely to be diagnosed in an outpatient setting compared to non-African Americans.[13] The African American patients in the region are less likely to have primary care physicians and perhaps wait until symptoms get worse and hence need admission more frequently compared to non-African American group. Additionally, African Americans are more likely to be uninsured and seek healthcare through the emergency room. Racial differences in COVID-19 that were observed may also reflect differences in the prevalence of chronic conditions that appear to increase the risk of severe illness. Disparities in chronic medical conditions disproportionately affect African Americans.[14] The interplay of the given social determinants of health likely plays a major role in the perceived increased morbidity observed in African Americans across the various health outcomes.

Our study has certain limitations that need to be acknowledged. This was a single center study, and hence findings may not be generalizable to other health care facilities. We do not have data on follow up after hospital discharge. It is possible that some patients may die later from complications of the disease or prolonged hospitalization itself. Not all laboratory studies were performed in all patients. Therefore, their roles in the clinical presentation of the study population may not be sufficiently represented. Variation in laboratory testing likely reflects rapid changes in clinical management of COVID-19 as the public health crisis unfolded globally. Finally, this was a retrospective study with data abstraction from the electronic medical record, and hence some data elements may not be accurately captured.

Conclusions

In our study, African Americans comprised the majority of hospitalized COVID-19 patients in our population, accounting for over 83% of inpatients. Overall, in-hospital mortality was similar between African Americans and non-African Americans, as was need for mechanical ventilation, ICU care, and new dialysis. African Americans were more likely to be discharged home compared to non-African Americans. With similar inhospital mortality between African Americans and non-African Americans, the disproportionately increased hospitalizations equate to increased total mortality in African Americans and is also likely to significantly increase morbidity burden in this population. As a result, further studies are necessary to assess the long-term effects this population may face. Urgent measures are also needed to address the stark racial disparities experienced by African American community.

Author's Contributions

R. Racine, P. Shah, J. Kenerly, J. Owens, and D. Hess aided in writing and editing the manuscript. J. Moore performed data analysis and created data tables. Authors would like to thank James Franklin for his help with data abstraction.

References

[1] COVID-19 Data in Motion. Johns Hopkins University & Medicine website. Updated October 5, 2020. Accessed December 15, 2020. https://coronavirus.jhu.edu.

[2] Communities of color at higher risk for health and economic challenges due to COVID-19. Kaiser Family Foundation website. Updated April 7, 2020. Accessed December 15, 2020. https://www.kff.org/disparities-policy/issuebrief/communities-of-color-at-higher-risk-for-health-and-economic-challenges-due-tocovid-19/

[3] **Strickland OL, Powell-Young Y, Reyes-Miranda C, et al**. African-Americans Have a Higher Propensity for Death from COVID-19: Rationale and Causation. *J Natl Black Nurses Assoc*. 2020;31(1):1-12.

[4] Demographic Trends of COVID-19 cases and deaths in the US reported to the CDC; 2020. Centers for Disease Control and Prevention website. Updated October 15, 2020. Accessed December 29, 2020. https://covid.cdc.gov/covid-data-tracker/#demographics

[5] Georgia Overall COVID-19 Status. Georgia Department of Health website. Updated December 29, 2020. Accessed December 29, 2020. https://dph.georgia.gov/covid-19-daily-status-report.

[6] **Mahajan UV, Larkins-Pettigrew M**. Racial demographics and COVID-19 confirmed cases and deaths: a correlational analysis of 2886 US counties. *J Public Health (Oxf)*. 2020;42(3):445-447. doi:10.1093/pubmed/fdaa070

[7] **Kullar R, Marcelin JR, Swartz TH, et al**. Racial Disparity of Coronavirus Disease 2019 in African American Communities. *J Infect Dis*. 2020;222(6):890-893. doi:10.1093/infdis/jiaa372

[8] **Nédélec Y, Sanz J, Baharian G, et al.** Genetic Ancestry and Natural Selection Drive Population Differences in Immune Responses to Pathogens. *Cell.* 2016;167(3):657-669.e21. doi: 10.1016/j.cell.2016.09.025

[9] **Wade DT**. Rehabilitation after COVID-19: an evidence-based approach. *Clin Med (Lond)*. 2020;20(4):359-365. doi:10.7861/clinmed.2020-0353

[10] **Gold JAW, Wong KK, Szablewski CM, et al**. Characteristics and Clinical Outcomes of Adult Patients Hospitalized with COVID-19 - Georgia, March 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69(18):545-550. Published 2020 May 8. doi:10.15585/mmwr.mm6918e1

[11] **Price-Haywood EG, Burton J, Fort D, et al**. Hospitalization and Mortality among Black Patients and White Patients with Covid-19. *N Engl J Med*. 2020;382(26):2534-2543. doi:10.1056/NEJMsa2011686

[12] **Moore JX, Langston ME, George V, et al.** Epidemiology of the 2020 pandemic of COVID-19 in the state of Georgia: Inadequate critical care resources and impact after 7 weeks of community spread [published online ahead of print, 2020 May 26]. *J Am Coll Emerg Physicians Open*. 2020;1(4):527-532. doi:10.1002/emp2.12127

[13] **Killerby ME, Link-Gelles R, Haight SC, et al.** Characteristics Associated with Hospitalization Among Patients with COVID-19 - Metropolitan Atlanta, Georgia, March-April 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69(25):790-794. Published 2020 Jun 26. doi:10.15585/mmwr.mm6925e1

[14] **Jackson BE, Oates GR, Singh KP, et al.** Disparities in chronic medical conditions in the Mid-South. *Ethnicity & Health*. 2017 Apr;22(2):196-208. doi: 10.1080/13557858.2016.1232805

Table 1. Characteristics of 710 Inpatients Tested Positive for Coronavirus Disease 2019 (COVID-19) by Race.

Characteristic	**All (*N* = 710)**	**African-Americans (*N* = 592)**	**Non African-Americans (*N* = 118)**	**p value[1]**
Median age (years) – IQR[2]	63.0 (51.0 – 73.0)	63.0 (51.0 – 73.0)	63.5 (51.0 – 74.0)	0.7
Age group, years – no. (%)[3]				
18 – 29	28 (3.9)	23 (3.9)	5 (4.2)	0.9
30 – 39	48 (6.8)	40 (6.8)	8 (6.8)	
40 – 49	77 (10.9)	65 (11.0)	12 (10.2)	
50 – 59	141 (19.9)	117 (19.8)	24 (20.3)	
60 – 69	175 (24.7)	151 (25.5)	24 (20.3)	
70+	241 (33.9)	196 (33.1)	45 (38.1)	
Male – no. (%)[3]	311 (43.8)	254 (42.9)	57 (48.3)	0.3
Body mass index, kg/m^2 – no. (%)[3]				
Less than 30 kg/m^2	283 (39.9)	215 (36.3)	68 (57.6)	<0.01
30 – 40 kg/m^2	265 (37.3)	231 (39.0)	34 (28.8)	
≥40 kg/m^2	162 (22.8)	146 (24.5)	16 (13.6)	
Insurance – no. (%)[3]				
Commercial	202 (28.5)	168 (28.4)	34 (28.8)	0.6
Medicare	395 (55.6)	325 (54.9)	70 (59.3)	
Medicaid	36 (5.1)	32 (5.4)	4 (3.4)	
Uninsured	77 (10.9)	67 (11.3)	10 (8.5)	
Baseline comorbidities – no. (%)[3]				
Hypertension	559 (78.7)	479 (80.9)	80 (67.8)	<0.01
Coronary artery disease	67 (9.4)	41 (6.9)	26 (22.0)	<0.01
Congestive heart failure	96 (13.5)	85 (14.4)	11 (9.3)	0.2
COPD[4]	73 (10.3)	49 (8.3)	24 (20.3)	<0.01
Asthma	85 (12.0)	68 (11.5)	17 (14.4)	0.4
Chronic kidney disease	117 (16.5)	96 (16.2)	21 (17.8)	0.7
Diabetes	306 (43.1)	262 (44.3)	44 (37.3)	0.2
Cancer	76 (10.7)	58 (9.8)	18 (15.3)	0.08
Chronic liver disease	9 (1.3)	5 (0.8)	4 (3.4)	0.02
Median number of comorbidities[5] (IQR)	2.0 (1.0 – 3.0)	2.0 (1.0 – 3.0)	2.0 (1.0 – 3.0)	0.5
Dementia	61 (8.73)	46 (7.9)	15 (13.2)	0.07
Stroke (CVA/TIA)	94 (13.4)	83 (14.2)	11 (9.6)	0.2
Health Behaviors – no. (%)[3]				
History of drug use	10 (1.4)	9 (1.3)	1 (0.9)	0.6
History of alcohol use	63 (8.9)	60 (10.1)	3 (2.5)	<0.01

History of smoking	133 (18.7)	112 (18.9)	21 (17.8)	0.8

[1] p value determined using Chi-square tests and a Wilcoxon rank-sum test for categorical and non-parametric continuous variables, respectively. [2] IQR denotes interquartile range. [3] Presented as number and column percentage. [4] COPD denotes Chronic obstructive pulmonary disease. [5] Total number of comorbidities summed from 9 baseline comorbidities.

Table 2. Clinical Course and Presentation of Inpatients Tested Positive for Coronavirus Disease 2019 (COVID-19) by Race.

Characteristic	**All (*N* = 710)**	**African-Americans (*N* = 592)**	**Non African-Americans (*N* = 118)**	**p value[1]**
On arrival in ED[2] – no. (%)				
Fever	309 (43.5)	273 (46.1)	36 (30.5)	<0.01
Cough	286 (40.3)	257 (43.4)	29 (24.6)	<0.01
Shortness of breath	390 (54.9)	321 (54.2)	69 (58.5)	0.4
Gastrointestinal symptoms[3]	140 (19.7)	122 (20.6)	18 (15.3)	0.2
Severe infection/disease	355 (50.0)	298 (50.3)	57 (48.3)	0.7
During hospital stay – no. (%)				
Septic shock	69 (97)	59 (10.0)	10 (8.5)	0.6
ARDS[4]	142 (20.0)	125 (21.1)	17 (14.4)	0.10
Median duration of symptoms (IQR)[5] – days	9.5 (2.0 – 17.0)	10.0 (3.0 – 17.0)	6.7 (3.0 – 13.4)	0.01
New renal replacement therapy	67 (9.6)	56 (9.6)	11 (9.6)	1.0
ICU admission	189 (26.6)	153 (25.8)	36 (30.5)	0.3
Mechanical ventilation	138 (19.4)	118 (19.9)	20 (17.0)	0.5
Median LOS (IQR)[5] – days	6.3 (3.3 – 12.9)	6.2 (3.4 – 12.6)	6.7 (3.0 – 13.4)	0.9
Mortality	116 (16.3)	95 (16.1)	21 (17.8)	0.6
Discharged to home	460 (64.8)	401 (67.7)	59 (50.0)	<0.01
Biomarkers - (IQR)[5]				
Procalcitonin	1.1 (0.6 – 2.7)	1.1 (0.6 – 2.8)	1.1 (0.7 – 1.9)	0.7
Ferritin	954 (410 – 1618)	1021 (463 – 1713)	620 (272 – 1401)	<0.01
D-dimer	1.9 (1.0 – 4.6)	2.0 (1.0 – 5.5)	1.7 (0.8 – 3.6)	0.1
Troponin	2.5 (0.5 – 6.0)	2.5 (0.5 – 6.0)	3.0 (0.4 – 6.0)	0.6
LDH[6]	353 (271 –	364 (286 – 480)	285 (212 – 372)	<0.01

	466)			
C-reactive protein	15.7 (7.2 – 23.7)	15.9 (7.4 – 24.2)	13.9 (6.0 – 21.14)	0.07

[1]p value determined using Chi-square tests and a Wilcoxon rank-sum test for categorical and non-parametric continuous variables, respectively.

[2]ED denotes emergency department.

[3] Nausea, vomiting, abdominal pain, or diarrhea.

[4]ARDS denotes acute respiratory distress syndrome.

[5]IQR denotes interquartile range

[6]Lactate Dehydrogenase

Table 3. Association between race and outcomes among Inpatients Tested Positive for Coronavirus Disease 2019 (COVID-19).

		Relative Risk (95% Confidence Interval)			
	No. Deaths (%)	**Crude**	**Model 1**	**Model 2**	**Model 3**
Risk of In-hospital mortality					
African Americans	95 (16.1)	0.90 (0.59 – 1.39)	0.92 (0.59 – 1.45)	0.94 (0.60 – 1.47)	0.90 (0.57 – 1.41)
Non-African Americans (Referent)	21 (17.8)	Referent	Referent	Referent	Referent
Risk of Mechanical Ventilation (Intubation)					
African Americans	118 (19.9)	1.18 (0.76 – 1.81)	1.01 (0.64 – 1.58)	1.01 (0.64 – 1.58)	0.97 (0.58 – 1.61)
Non-African Americans (Referent)	20 (17.0)	Referent	Referent	Referent	Referent
Risk of intensive care unit admission					
African Americans	153 (25.8)	0.85 (0.62 – 1.15)	0.73 (0.53 – 1.01)	0.74 (0.53 – 1.01)	0.71 (0.48 – 1.05)
Non-African Americans (Referent)	36 (30.5)	Referent	Referent	Referent	Referent

Risk of new dialysis					
African Americans	56 (9.6)	1.00 (0.54 – 1.85)	1.05 (0.55 – 2.00)	1.06 (0.56 – 2.04)	1.21 (0.61 – 2.41)
Non-African Americans (Referent)	11 (9.6)	Referent	Referent	Referent	Referent
Risk of discharge to home					
African Americans	401 (67.7)	**1.35 (1.12 – 1.64)**	**1.28 (1.06 – 1.54)**	**1.27 (1.05 – 1.54)**	**1.20 (1.02 – 1.42)**
Non-African Americans (Referent)	59 (50.0)	Referent	Referent	Referent	Referent

Model 1: adjusted for BMI, hypertension, coronary artery disease, chronic obstructive pulmonary disease, and chronic liver disease.

Model 2: additionally adjusted for alcohol use.

Model 3: additionally adjusted for fever, cough, duration of symptoms